

directives. All hospitals seeking accreditation from the Joint Commission on Accreditation of Healthcare Organizations must have DNR policies. Policies should include the management of DNR orders when surgery and anesthesia are required.

Communication among surgical professionals, the primary care team, and the patient and family about DNR orders in the perioperative period must be clear and open. The goal is to remove ambiguity about the perioperative care of patients to the greatest possible extent. This will require patience and time. Both must be provided.

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## Novel Approaches to the Treatment of Neuropathic Pain

INJURY OR DISEASE of the central or peripheral nervous system causes some of the most agonizing and intractable chronic pain problems. Pain can result from nervous system injury caused by direct trauma (brachial plexus avulsion, phantom limb pain), ischemia (thalamic syndrome), infection (tabes dorsalis, postherpetic neuralgia), metabolic derangements (diabetic neuropathy), or tumor invasion (lumbosacral plexopathy). Patients with these syndromes may describe sensations of intolerable burning, searing, crushing, electric shocks, pins and needles, or tearing of the flesh and often suffer serious disability as a result. Suicide is an unusual but well-described complication of neuropathic pain.

Anesthesiologists are frequently requested to consult on patients with neuropathic pain with the hope that a patient may respond favorably to a neural blockade technique. Unfortunately, even when there is an initial favorable response to a block, the results may not be long-lasting, and medical management often assumes an important role. The treatment of neuropathic pain is complicated by the fact that routine analgesics such as nonsteroidal anti-inflammatory drugs and opiates may be ineffective. In fact, a lack of pain relief from standard doses of opiates may point to the diagnosis of neuropathic pain. Fortunately other types of drugs not normally classified as analgesics are often effective for the relief of neuropathic pain. These include tricyclic antidepressants, anticonvulsants, parenteral administration of topical anesthetics, and  $\alpha$ -adrenergic antagonists.

It is now well established that tricyclic antidepressants relieve pain in a variety of neuropathic conditions. This analgesic action of the tricyclics is independent of any antidepressant effect. Amitriptyline hydrochloride has been the most extensively studied and most widely used tricyclic for the relief of neuropathic pain, but many other tricyclics have proved to be effective, including nortriptyline hydrochloride, imipramine hydrochloride, and desipramine hydrochloride. Toxicity is rarely a problem in the dose ranges normally required for analgesia, and tricyclics do not produce euphoria or tolerance so that abuse potential is low. The mechanism of

analgesia from the tricyclic compounds is thought to be an inhibition of the uptake of biogenic amines, such as serotonin and norepinephrine, which are known to inhibit pain-transmitting neurons.

Anticonvulsant drugs may also be useful for the treatment of neuropathic pain, particularly when a patient reports a paroxysmal lancinating or "electric shock" component to the pain. Experimental evidence suggests that injured nerves may develop hyperexcitability and spontaneous ectopic activity. Thus, paroxysmal neuralgic pain resembles epilepsy in certain respects, and in these patients antiepileptic drugs may provide pain relief. Carbamazepine is now the treatment of choice for trigeminal neuralgia, and more recently clonazepam and sodium valproate have been shown to be useful for the treatment of various lancinating pains, as may occur in postherpetic neuralgia, tabes dorsalis, phantom limb pain, diabetic neuropathy, and the thalamic syndrome.

The intravenous infusion of lidocaine has been shown to suppress spontaneous activity in neuromas and to reduce pain in diabetic neuropathy and other neuropathic conditions. Intravenous lidocaine infusion may eventually prove to be a useful test to identify a neuropathic component to a chronic pain syndrome. These observations have stimulated interest in the use of the oral antiarrhythmic and lidocaine congener mexiletine hydrochloride, which was recently shown to reduce neuropathic pain in patients in whom alternative medical regimens had been unsuccessful. In particular, patients with a "burning" component to the pain seemed to benefit from oral mexiletine, and side effects were minimal. The mechanism of action of these drugs is unclear, but may involve alterations in spinal cord processing, rather than by peripheral axonal or receptor blockade.

Neuropathic pains are often maintained or augmented by efferent activity in the sympathetic nervous system, as occurs in the reflex sympathetic dystrophy syndrome. This condition has traditionally been diagnosed and treated by repeated regional anesthetic blocks of the appropriate sympathetic ganglia. Recent experimental evidence has suggested that sympathetically maintained pains are mediated largely through  $\alpha$ -adrenergic mechanisms. The intravenous infusion of phentolamine mesylate has been described as a reliable, specific, and easy-to-do diagnostic test for sympathetically maintained pain. For patients who respond to phentolamine infusion, daily treatment with oral phenoxybenzamine hydrochloride or other  $\alpha$ -adrenergic antagonists may permanently eradicate sympathetically mediated components of the pain. Side effects such as orthostatic hypotension may limit therapy, however.

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## Postoperative Pain

THE SIDE EFFECTS of postoperative pain management have long been a focus of attention. Concern has now shifted to the possible morbidity of inadequate therapy; indeed, there is a growing body of evidence that postoperative pain may have harmful physiologic and psychological effects. Specifically, pain may adversely affect respiratory function, contribute to